

WHAT IS CLAIMED IS:

1. A device for attaching at least three electrodes to a subject for stimulating abdominal muscles of the subject, comprising:
- attachment means for extending around the torso of the subject;
- a main locating means provided on the attachment means for locating a central electrode of the at least three electrodes adjacent the umbilicus of the subject; and
- two secondary locating means provided on the attachment means disposed on respective opposite sides of the main locating means for locating two corresponding side electrodes of the at least three electrodes spaced apart from the central electrode;
- wherein application of at least one pulsed signal to the subject through the respective central and side electrodes stimulates the abdominal muscles of the subject.
2. The device as claimed in claim 1, wherein the two corresponding side electrodes of the at least three electrodes are spaced apart from the central electrode in a general direction towards a corresponding one of the left and right mid-axillary lines of the torso intermediate the rib cage and corresponding left and right iliac crests.
3. The device as claimed in claim 1 wherein the secondary locating means are disposed on the attachment means for locating the respective side electrodes towards the mid-point of the corresponding mid-axillary line between the rib cage and the corresponding iliac crest.
4. The device as claimed in claim 1 wherein the secondary locating means are disposed on the attachment means for locating the respective side electrodes adjacent the corresponding mid-axillary line.

5. The device as claimed in claim 4, wherein the secondary locating means are disposed on the attachment means for locating the respective side electrodes adjacent the mid-point of the corresponding mid-axillary line between the rib cage and the corresponding iliac crest.

6. The device as claimed in claim 1, wherein the main locating means is disposed on the attachment means for locating the central electrode on the umbilicus and extending around the umbilicus.

7. The device as claimed in claim 1, wherein the main locating means is disposed on the attachment means for locating the central electrode on the umbilicus and extending completely around the umbilicus.

8. The device as claimed claim 1, further comprising a reference means provided on the attachment means for locating the attachment means on the torso relative to an anatomical reference.

9. The device as claimed in claim 8, wherein the reference means is provided for locating the attachment means circumferentially around the torso.

10. The device as claimed in claim 8, wherein the reference means is provided for locating the attachment means vertically along the torso.

11. The device as claimed in claim 8, wherein the main locating means acts as the reference means for locating the attachment means relative to the anatomical reference provided by the umbilicus.

12. The device as claimed in claim 1, further comprising two sets of at least two secondary locating means disposed on the respective opposite sides of the main locating means

for facilitating selective location of the respective side electrodes for accommodating different girths of torso.

13. The device as claimed in claim 12, wherein each set of secondary locating means comprises three secondary locating means.

14. The device as claimed in claim 1, wherein portions of the attachment means on respective opposite sides of the main locating means between the main locating means and the corresponding secondary locating means are formed of resilient material for facilitating resilient stretching of the attachment means between the main and corresponding secondary locating means.

15. The device as claimed in claim 14 characterized in that the attachment means is formed of a resilient material for facilitating stretching of the attachment means around the torso, the resilient portions of the attachments means being of greater stretchability than that of the rest of the attachment means.

16. The device as claimed in claim 1, further comprising a main electrically conductive contact means provided on the attachment means corresponding to each main locating means for receiving the at least one pulsed signal and for relaying the signal to the corresponding central electrode.

17. The device as claimed in claim 16, wherein each main contact means is located within the corresponding main locating means.

18. The device as claimed in claim 1, further comprising two secondary electrically conductive contact means provided on the attachment means for receiving the at least one pulsed signal and for relaying the signal to the respective corresponding side electrodes.

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19. The device as claimed in claim 18, wherein each secondary contact means is located adjacent the corresponding secondary locating means or the corresponding set of secondary locating means.

20. The device as claimed in claim 18, wherein each secondary contact means is located adjacent the corresponding set of secondary locating means so that irrespective of which secondary locating means is selected for locating the corresponding side electrode the side electrode is in electrically conductive engagement with the secondary contact means.

21. The device as claimed in claim 1, wherein each main and secondary locating means is provided as a visually perceptible locating means.

22. The device as claimed in claim 1, wherein each main and secondary locating means is formed as a corresponding locating mark on the attachment means.

23. The device as claimed in claim 1, wherein each locating means is adapted for locating a patch type electrode.

24. The device as claimed in claim 1, wherein the at least three electrodes are formed as a removable part of the device.

25. The device as claimed in claim 24, wherein each electrode is a patch type electrode.

26. The device as claimed in claim 25, wherein each side electrode is sized to cover at least a portion of the corresponding lower thoracic nerves and the corresponding first and second lumbar nerves.

27. The device as claimed in claim 25, wherein each central electrode is sized to extend substantially across the rectus abdominus muscle.

28. The device as claimed in claims 25, wherein each electrode defines an area of contact over which the electrode makes direct electrical contact with the subject, the area of contact of each side electrode being such as not to exceed the area of contact of the central electrode.

29. The device as claimed in claim 28, wherein each side electrode is of width in a circumferential direction relative to the torso of the subject in the range of 50 mm to 150 mm.

30. The device as claimed in claim 25, further comprising an electrically conductive coating provided on a side of each electrode facing away from the attachment means for electrically coupling the electrode to the torso of the subject.

31. The device as claimed in claim 30, wherein the coating is a gel type coating.

32. The device as claimed in claim 1, further comprising a receiving means provided in the attachment means for receiving a signal generating means for generating the at least one pulsed signal.

33. The device as claimed in claim 32, further comprising a main electrical connecting means extending between the receiving means and signal generating means, and each main contact means for relaying the at least one pulsed signal from the signal generating means to the corresponding main contact means.

34. The device as claimed in claim 33, wherein each electrical connecting means is located within the attachment means.

35. The device as claimed in claim 32, further comprising a secondary electrical connecting means extends between the receiving means and each secondary contact means for relaying the at least one pulsed signal from the signal generating means to the corresponding secondary contact means.

36. The device as claimed in claim 35, wherein each electrical connecting means is located within the attachment means.

37. The device as claimed claim 32, wherein the receiving means is a releasable receiving means for releasably receiving the signal generating means.

38. The device as claimed in claim 1, wherein the attachment means comprises a belt.

39. The device as claimed in claim 38, further comprising a securing means provided on the belt for securing the belt around the torso of the subject.

40. The device as claimed in claim 1, further comprising a main fastening means provided corresponding to the main locating means for fastening a central electrode to the attachment means adjacent the corresponding main locating means.

41. The device as claimed in claim 40, wherein the main fastening means comprises a stud fastener.

42. The device as claimed in claim 1, further comprising two secondary fastening means provided in the attachment means for fastening the respective side electrodes to the attachment means adjacent the corresponding selected secondary locating means.

43. The device as claimed in claim 42, wherein each fastening means comprises a stud fastener.

44. The device as claimed in claim 43, wherein each stud fastener comprises a female part and a male part.

45. The device as claimed in claim 44, wherein each stud fastener is electrically conductive so that the portions of the stud fasteners fastened to the attachment means form the corresponding contact means.

46. The device as claimed in claim 44, wherein an exposed surface of the portions of each stud fastener fastened to the attachment means is of electrically insulating material.

47. The device as claimed in claim 46, wherein the exposed surface of each part of each stud fastener attached to the attachment means is coated with an electrically insulating coating.

48. The device as claimed in claim 43, wherein the stud fastener comprises a first part for attaching to a corresponding electrode, and a second part for attaching to the attachment means.

49. The device as claimed in claim 48, wherein the first and second parts of the stud fastener engage each other with electrically conductive engagement.

50. The device as claimed in claim 48, wherein an exposed external surface of the second part of the stud fastener which abuts the first part of the stud fastener is of electrically insulating material.

51. The device as claimed in claim 50, wherein the electrically insulating material is provided by an electrically insulated coating on the exposed abutting surface.

52. A method for stimulating abdominal muscles of a subject, comprising the steps of:

providing at least three electrodes, one of the at least three electrodes being a central electrode located adjacent the umbilicus of the subject, and the other two electrodes being side electrodes located on the subject spaced apart from the central electrode on respective sides thereof in a general direction towards a corresponding one of the left and right mid-axillary lines of the torso intermediate the rib cage and corresponding left and right iliac crests; and

53. The method as claimed in claim 52, wherein each side electrode is located towards the mid-point of the corresponding mid-axillary line between the rib cage and the corresponding iliac crest.

54. The method as claimed in claim 52, wherein each side electrode is located adjacent the corresponding mid-axillary line.

55. The method as claimed in claim 54, wherein each side electrode is located adjacent the mid-point of the corresponding mid-axillary line between the rib cage and the corresponding iliac crest.

56. The method as claimed in claim 52, wherein the central electrode is located on the umbilicus and extends around the umbilicus.

57. The method as claimed in claim 52, wherein the central electrode is located on the umbilicus and extends completely around the umbilicus.

58. The method as claimed in claim 52, wherein the central electrode is located on the umbilicus, but with a greater area of the central electrode located below the umbilicus than above the umbilicus.

59. The method of claim 52, further comprising the step of applying the at least one pulsed signal to the subject so that the signal passes subcutaneously through the subject between the at least three electrodes.

60. The method as claimed in claim 52, wherein the at least one pulsed signal is applied simultaneously to each of the side electrodes.

61. The method as claimed in claim 52, wherein each pulsed signal comprises a plurality of pulses at intervals in the range of 5 milliseconds to 1000 milliseconds.

62. The method as claimed in claim 61, wherein each pulsed signal comprises a plurality of pulses at intervals in the range of 20 milliseconds to 40 milliseconds.

63. The method as claimed in claim 62, wherein each pulsed signal comprises a plurality of pulses at intervals of approximately 30 milliseconds \pm 20%.

64. The method as claimed claim 52, wherein the interval between pulses of each pulsed signal is adjustable.

65. The method as claimed in claim 52, wherein each pulsed signal comprises pulses of duration in the range of 10 microseconds to 200000 microseconds.

66. The method as claimed in claim 65, wherein each pulsed signal comprises pulses of duration in the range of 50 microseconds to 1000 microseconds.

67. The method as claimed in claim 66, wherein each pulsed signal comprises pulses of duration in the range of 100 microseconds to 500 microseconds.

68. The method as claimed in claim 67, wherein each pulsed signal comprises pulses of duration of approximately 300 microseconds \pm 20%.

69. The method as claimed in claim 52, wherein the duration of each pulsed signal is adjustable.

70. The method as claimed in claim 52, wherein each pulsed signal comprises a plurality of pulses of magnitude in the range of 0 mA to 100 mA.

71. The method as claimed in claim 52, wherein the magnitude of each pulse of each pulsed signal is adjustable.